

## **Raspberry Amido Amines and Betaines as a Delivery System for Natural Antioxidants**

### **[001] BACKGROUND OF THE INVENTION**

**[002]** The present invention relates to raspberry seed oil derivatives derived by the reaction of dimethyl amino propyl amine, and cold pressed raspberry seed oil. The choice of cold pressed raspberry seed oil as a raw material in the preparation of the compounds of the present invention is critical, since it has been found that the cold pressed raspberry seed oil contains a unique antioxidant which when reacted with a dimethyl amino propyl amine result in products that deliver said actives to the skin and hair, resulting in protection of the skin and hair from environmental factors such as acid rain, ozone attack and UV degradation.

**[003]** U.S. patent 6,391,345 issued May 2002 describes the refining of cold pressed cranberry seed oil, and is incorporated herein by reference. American cranberries, *Vaccinium macrocarpon*, are native plants of open, acid peat bogs in North America. Raspberry plants are evergreen perennial vines that produce runners and upright branches with terminal flower buds. This process is also applicable to raspberry seed oil.

**[004]** Raspberries have historically been harvested and either ingested as whole berries, such as in raspberry sauce, or have been processed for their juice. Pulp remaining after raspberry juice extraction processing has historically been regarded as an undesirable waste product with little or no utility.

**[005]** Raspberries are grown all over the world. They are a popular food, consumed in large quantities.

**[006]** Raspberries contain ellagic acid ( $C_{14}H_6O_8$ ). This acid is a non-flavonoid polyphenol present in the form of hydrolysable tannins, which has been found to protect chromosomes from radiation induced lipid peroxidation.

**[007]** Raspberry oil contains a high level of omega 3 and omega 6 linoleic acid. These are essential fatty acids. Under normal circumstances, oils useful in the cosmetic industry are refined with a variety of steps that are designed to maximize triglyceride content, and minimize color and odor. These steps include steam distillation, a process in which steam is sparged through the oil to remove odor and color bodies and solvent extraction with compounds like hexane, which remove additional odor and color bodies. We have learned that these processes, while improving color and odor, remove many of the desirable “active” materials. What results is a light color, low odor triglyceride with no appreciable added skin benefits. We have surprisingly learned that when the raspberry seed oil that is cold processed is reacted with dimethyl amino propyl amine (DMAPA), the actives (normally removed in non-cold press process) remain in the product, become water-soluble and have outstanding activity on the skin. In essence two things happen when the cold pressed raspberry seed oil is reacted with DMAPA. First the triglyceride reacts with the primary amino group of the DMAPA compound, giving a product that when neutralized to a pH of 7 with acetic acid is water-soluble. Secondly, these specific compounds solubilizes the active components there as a consequence of cold pressing. Thirdly, these very desirable materials are deposited on the skin, based upon its proclivity

to remain on the skin. The result is a unique delivery of the actives to the skin from totally natural fruit oil.

**[008]** The compounds of the present invention all get their properties from a common intermediate, an amido amine. This amido amine is transformed into betaines, quats and amine oxides with unique properties in personal care applications.

#### **[009] SUMMARY OF THE INVENTION**

**[010]** The present invention relates to a series of products derived from the reaction of cold pressed raspberry oil and dimethyl aminopropyl amine. The derivatives include betaines, amine oxides and quaternary compounds. The dimethyl aminopropyl amine intermediate is a key product in the preparation of the other compounds, and is key to the functionality.

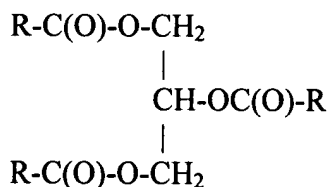
**[011]** The present invention also relates to a process of treating hair and skin, which comprises contacting the hair and skin with an effective anti-oxidant containing amount of raspberry compounds of the preset invention.

## **[012] DETAILED DESCRIPTION OF THE INVENTION**

**[013]** U.S. patent 6,391,345 issued May 2002 describes a cold pressed process for cranberry oil. We have surprisingly found that if the same process is used on raspberry oil specific antioxidant materials that are removed by more aggressive refining processes like solvent extraction. These compounds surprisingly survive the reaction with DMAPA resulting in a highly substantive delivery system for these very desirable natural compounds.

**[014]** Also critical to the practice of the present invention is the fatty composition of the cold pressed raspberry oil. This raspberry oil has a substantially clear appearance with a pale yellow color.

**[015]** Cold Pressed Raspberry Oil is a triglyceride conforming to the following structure:



**[016]** The oil is referred to as *Rubus idaeus* seed oil and has a CAS number of 381718-28-1

The R-C(O)- group has the following composition:

<u>Component</u>	<u>% Weight</u>
18:1 oleic	10-20
18:2 linoleic	30-40
18:3 linolenic (alpha)	45-55
alpha tocopherol	46 mg/gram
Ellagic Acid	450-650 ppm

**[017] Distribution by type of fatty group**

<u>Component</u>	<u>% Weight</u>
Saturated	3%
Polyunsaturated content	86%
Mono unsaturated	11%

**[018]** The oil contains the following very critical “active” components for skin and hair care:

<u>Material</u>	<u>Concentration</u>
18:3 linolenic (alpha)	45-55%
alpha tocopherol	46 mg/gram
Ellagic Acid	450-650 ppm

**[019]** As can be seen, the cold pressed raspberry seed oil is a rich source of compounds having important properties when applied to hair and skin. The cold pressed raspberry oil can shield against UV-A induced damage by scattering light as well as by light spectrum absorption. The cold pressed raspberry oil has, then activity as a broad spectrum UV

protectant. The raspberry oil may be used alone or in combination with other conventional sunscreens.

**[020]** The ability to make derivatives of the oil in which the protection of the components of the cold pressed oil remain functional is a major aspect of the present invention.

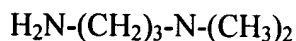
**[021]** Cold pressed raspberry seed oil has a very high concentration of gamma tocopherol. This level is much higher than is found in oils such as safflower and grape, which are 11 and 33, respectively. The gamma tocopherol has the most antioxidant capacity of all of the tocopherols and contributes to the stability of highly unsaturated oils in the raspberry oil. It is believed that the presence of the high gamma tocopherol concentration makes raspberry oil an excellent additive to animal food-both human and non-human. The gamma tocopherol may be as important as alpha tocopherol in preventing degenerative diseases.

**[022]** Cold pressed raspberry seed oil has a high linolenic acid content. Linolenic acid has been implicated as a food additive and nutraceutical in preventing coronary heart disease and cancer. Raspberry oil also has a high polyunsaturated: saturated ratio in a neutral lipid fraction, of 10:1. This ratio is regarded as having value in reducing serum cholesterol, atherosclerosis and in preventing heart disease.

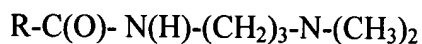
**[023]** Cold pressed raspberry seed oil has a rather dark yellow to orange color because it contains carotenoids. The carotenoids are usable as colorant substitutes for materials such

as carotenes, annotos, and apocarotenals used in the nutraceutical and oil industries.

[024] The cold pressed raspberry seed oil, containing all of the above desirable compounds, is reacted with a dimethyl amino propyl amine conforming to the following structure:



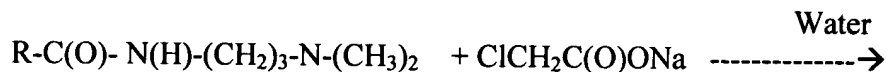
[025] To provide an amid conforming to the following structure:

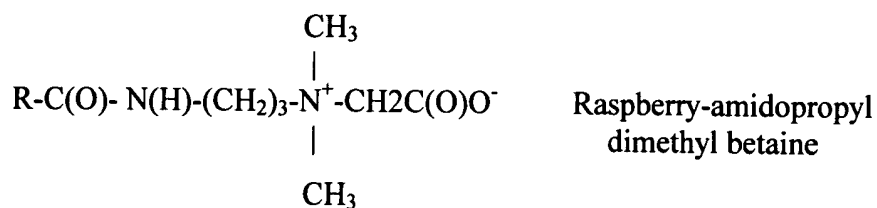


R is derived from cold pressed raspberry seed oil and has the composition;

[026]	<u>Component</u>	<u>% weight</u>
	18:1 oleic	10-20
	18:2 linoleic	30-40
	18:3 linolenic (alpha)	45-55
	alpha tocopherol	46 mg/gram
	Ellagic Acid	450-650 ppm

[027] The intermediate is subsequently reacted to form betaines, amine oxides and quaternary compounds as follows:





**[028]** The current invention describes a composition, which is prepared by the reaction of:

(1) cold pressed raspberry seed oil

(2) dimethylaminopropyl amine.

**[029]** The compounds of the present invention deliver these active products to skin, therefore the invention also discloses a process for conditioning skin which comprises contacting the skin with an effective conditioning concentration of a raspberry DMAPA compound, which conforms to the following structure;



wherein;

R is derived from cold pressed raspberry seed oil.



### **[030] Examples**

**[031]** The compounds of the present invention are made from commercially available raw materials.

### **[032] Raw Materials**

#### **[033] COLD PRESSED RASPBERRY SEED OIL**

**[034]** Cold Presses Raspberry seed oil is an item of commerce sold by Regal Trade & Consult LLC. of Hoboken, N.J. It is processed using U.S. patent 6,391,345 issued May 2002, only applied to raspberry seed oil not cranberry seed oil.

#### **[035] Dimethyl Aminopropyl Amine (DMAPA)**

**[036]** DMAPA is an item of commerce available from several suppliers including BASF.

### **[037] General Procedure**

**[038]** To grams of 400 grams of Cold Pressed Raspberry seed oil is added. 200 grams of dimethylaminopropyl amine.

**[039]** The reaction mass is heated to 180-200°C, under good agitation. As the reaction mass is held at temperature, the material clears and becomes homogeneous. The reaction mass is held for eight hours at reaction temperature, during that time the excess DMAPA refluxed back into the batch. The reaction progress is followed by alkali value and % ester. During the reaction the Alkali Value stabilizes and does not change over a 2 hour

period at temperature, and the % ester becomes vanishingly small. The excess DMAPA is stripped off. The resulting product is used without additional purification.

#### **[040] Preparation of the Betaine**

**[041]** To a suitable reaction vessel equipped with agitation and heating capabilities is added grams of the raspberry amidopropyl dimethyl amine. Next add grams of sodium monochloroacetic acid under good agitation. The resulting mixture is heated to 80-90°C and held 8-10 hours, keeping the pH between 8-9 by addition of small amounts of NaOH as required. During this time NaCl is generated and followed by titration. When the % NaCl reaches 98% of the theoretical, the reaction is cooled. The resulting product is a clear yellow liquid that is used without additional purification.

#### **[042] Applications Examples**

**[043]** The compound of the present invention are water-soluble surface active compound that has an extraordinary skin feel and provide antioxidant, and other desirable properties from the components that are not removed from the raspberry oil when it is cold processed. The cold processing leaves behind the desirable components, which in turn are not destroyed by the reaction and surprisingly, become oil-soluble and delivered to the skin.

**[044]** While the illustrative embodiments of the invention have been described with particularity, it will be understood that various other modifications will be apparent to and can be readily made by those skilled in the art without departing from the spirit and scope of the invention. Accordingly, it is not intended that the scope of the claims

appended hereto be limited to the examples and descriptions set forth hereinabove but rather that the claims be construed as encompassing all the features of patentable novelty which reside in the present invention, including all features which would be treated as equivalents thereof by those skilled in the art to which the invention pertains